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Cormac Herley

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EXAMINER

YUAN, KATHLEEN S

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 12/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/606,002

Applicant(s)

HERLEY, CORMAC

Examiner

Kathleen S. Yuan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims that recite nothing but the physical characteristics of a form of energy, such as frequency, voltage, or strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 I.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.

...a signal does not fall within one of the four statutory classes of Sec 101.

...signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

2. Claims 1-11 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 1 is drawn to functional descriptive material recorded on a computer-readable medium. Normally, the claim would be statutory. However, the specification, at page 13 defines the claimed computer readable medium as encompassing statutory media such as computer storage media such as RAM, ROM, flash memory, CD-ROM, etc, as well as non-statutory subject matter such as communication media such as a signal or carrier wave.

A "signal" embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of §101. Rather, "signal" is a form of energy, in the absence of any physical structure of tangible material.

Because the full scope of the claim as properly read in light of the disclosure encompasses non-statutory subject matter, the claim as a whole is non-statutory. The examiner suggests amending the claim to include the disclosed tangible computer readable media, while at the same time excluding the intangible media such as communication media. Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 9 recites the limitation " the corresponding blocks ". There is insufficient antecedent basis for this limitation in the claim. Examiner believes that 9 should depend on claim 7 instead of claim 8, which would eliminate the 112 problem, and thus will treat the claims this way. However, appropriate correction is required.

Claim Rejections - 35 USC § 102

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6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 12, 14 and 15 are rejected under 35 U.S.C. 102(e) as being unpatentable by U.S. Patent Application Publication No. 20020181762 (Silber).

8. Regarding claim 12, Silber discloses a system for removing occlusions from a composite image formed from a set of images of a scene, comprising (fig. 1): acquiring at least two images of a scene from approximately the same viewpoint (fig. 3, s300); aligning each of the images to a base image selected from the set of images (fig. 3, step 400); identifying areas of potential occlusion in each of the aligned images (fig. 3, step 600); selecting a seed image from the set of images (fig. 5, step 705); determining whether each area of potential occlusion in the seed image is an actual area of occlusion by examining each area of potential occlusion in the seed image to determine whether a level of discontinuity along an outer edge of each area of discontinuity exceeds a predetermined threshold (fig. 5, step 730 and pg 9, pp. 0089), since the amount of focus of the line, which is equivalent to discontinuous because it is not a solid, clear line, is compared to a threshold; replacing areas of actual occlusion in the seed image with corresponding non-occluded areas from one of the other images in the

set to form a composite image from the seed image (fig. 5, step s770 and as seen in fig. 13).

9. Regarding claim 14, Silber discloses aligning each of the images to the base images comprises applying a geometric transform to each image relative to the base image for registering each of the images to the base image by pattern matching and adjusting the source images based on the analysis to place the images into spatial congruence, thus, transforming the images geometrically (pg. 5, pp. 0059).

10. Regarding claim 15, Silber discloses individually cropping each image so that all images cover approximately the same view of the scene (fig. 3, s500).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-3, 7-9, 11, 17-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of U.S. Patent No. 6366316 (Parulski et al).

Regarding claim 1, Silber discloses a computer-readable medium having computer executable instructions for automatically constructing an image mosaic from a set of images of a scene (fig. 1, 120), said computer executable instructions comprising: inputting a set of images of a scene (fig. 3, s300); registering the set of images by aligning the images (fig. 3, s400); determining, for each image, whether regions of

potential occlusion in each image represent actual regions of occlusion, or whether the regions of potential occlusion in each image represent regions of non-occlusion, by determining a level of discontinuity along an exterior border of each region of potential occlusion in each image (fig. 5, step 730, as explained above); and creating a mosaic image by replacing at least one actual region of occlusion in one image from the set of images with corresponding regions of non-occlusion from at least one other image from the set of images of the scene (fig. 13).

Silber does not disclose expressly comparing the set of images to identify areas of difference between the images for all images, said areas of difference representing regions of potential occlusion in each image.

Parulski et al discloses comparing a set of images to identify areas of difference between the images, said areas of difference representing regions of potential occlusion (fig. 1, step 22).

Silber and Parulski are combinable because they are from the same field of endeavor, i.e. compositing images and using images with different areas of depth.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initially find potential areas by comparing the images for differences.

The suggestion/motivation for doing so would have been to speed processing by initially finding areas of an obvious different depth quickly and easily.

Therefore, it would have been obvious to combine system of Silber with the comparing images of Parulski et al to obtain the invention as specified in claim 1.

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13. Regarding claim 2, Silber discloses that registering the images for aligning the image (fig. 3, step 400) by pattern matching the image, which will match up the patterns between the images, thus translating, rotating and scaling the image accordingly (pg. 5, pp. 0059).

14. Regarding claim 3, Silber discloses cropping the images after registering the set of images so that all images cover approximately the same view of the scene (fig. 3, s500).

15. Regarding claim 7, Parulski et al discloses comparing the set of images to identify areas of difference between the images for all images further comprises comparing corresponding blocks of image pixels between each image to determine whether the corresponding blocks match, as can be seen in fig. 1, since the blocks of image pixels in item 12 are compared to the corresponding blocks of fig. 18 to see if they match in order to create the mask in 22.

16. Regarding claim 8, Parulski et al discloses comparing the set of images to identify areas of difference between the images for all images further comprises automatically constructing at least one image mask for identifying non-occluded regions and regions of potential occlusion in the set of images (fig. 1, items 22 and 24).

17. Regarding claim 9, Parulski et al discloses comparing the blocks to a predetermined matching threshold that is predetermined from a look up table (col. 3, lines 55-60).

18. Regarding claim 11, Parulski et al discloses a user interface for excluding one or more actual regions of occlusion from being replaced with corresponding regions of non-occlusion by allowing the user to edit the mask (col. 3, lines 63-66).

19. Claim 17 is rejected for the same reasons as claims 7 and 9. Thus, the arguments analogous to that presented above for claims 7 and 9 are equally applicable to claim 17. Claim 17 distinguishes from claims 7 and 9 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

20. Regarding claim 18, Parulski et al discloses identifying areas of potential occlusion in each of the aligned images further comprises a pixel-by-pixel comparison of corresponding pixels between each image, by taking a direct difference between the pixels (fig. 1, step 24) to determine whether the corresponding pixels match within a predetermined threshold, the predetermined threshold being defined from a look up table (col. 3, lines 55-60).

21. Regarding claim 19, Silber discloses a map that works like a mask (fig. 12). Parulski et al further discloses this as a mask (fig. 1, step 24). Therefore, Parulski et al discloses identifying areas of potential occlusion in each of the aligned images further comprises automatically constructing an image mask for identifying all regions of potential occlusion in the set of images (fig. 1, step 24).

22. Regarding claim 21, Silber discloses a computer-implemented process for removing occlusions from a mosaic image created from a set of images of a scene (fig. 3-9), comprising: inputting a set of two or more images of a scene (fig. 3, s300); aligning each of the images to a base image selected from the set of images (fig. 3, s400);

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determining a level of discontinuity along an outer edge of each area of potential occlusion for each image, said level of discontinuity indicating an area of actual occlusion where the level of discontinuity exceeds a predetermined discontinuity threshold, and said level of discontinuity indicating an area of non-occlusion where the level of discontinuity is less than the predetermined discontinuity threshold (fig. 5, s730, and as explained above); creating an image mask, essentially, for each image by creating a composite image mask indicating in each image which areas are occluded and not occluded, said image masks indicating areas of occlusion and areas of non-occlusion for each image (fig. 12); and using the image mask for each image for creating a mosaic image by replacing areas of actual occlusion in one of the images with corresponding areas of non-occlusion from one of the other images (fig. 13). Parulski et al discloses comparing each of the aligned images to identify areas of potential occlusion in each of the aligned images (fig. 1, step 24), and also calls the occlusion map a mask (fig. 1, step 24).

23. Claims 4, 5, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Parulski et al and further in view of U.S. Patent Application Publication No. 20030202715 (Kinjo)

Regarding claim 4, Silber (as modified by Parulski et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Silber (as modified by Parulski et al) does not disclose expressly balancing the set of images.

Kinjo discloses balancing input images before further processing (pg. 4, pp. 51).

Silber (as modified by Parulski et al) and Kinjo are combinable because they are from the same field of endeavor, i.e. image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to balance the image before any further processing.

The suggestion/motivation for doing so would have been to help obtain the best composite image by using the best representations possible early on.

Therefore, it would have been obvious to combine the medium of Silber (as modified by Parulski et al) with the balancing of Kinjo to obtain the invention as specified in claim 4.

24. Regarding claim 5, balancing the images comprises histogram averaging of the images, since the density histograms are found and averages are calculated and adjusted (pg. 4, pp. 51) based on the input image, and thus anything in the image including the targets.

25. Claims 26 and 27 are rejected for the same reasons as claims 4 and 5, respectively. Thus, the arguments analogous to that presented above for claims 4 and 6 are equally applicable to claims 26 and 27. Claims 26 and 27 distinguish from claims 4 and 5 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

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26. Claims 4, 6, 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Parulski et al and further in view of U.S. Patent No. 6222637 (Ito et al).

Regarding claim 4, Silber (as modified by Parulski et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Silber (as modified by Parulski et al) does not disclose expressly balancing the set of images.

Ito et al discloses balancing input images by using a white balance circuit obtained from the camera before further processing (col. 14, lines 36-38).

Silber (as modified by Parulski et al) and Ito et al are combinable because they are from the same field of endeavor, i.e. image processing and compositing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to balance the image before any further processing.

The suggestion/motivation for doing so would have been to help obtain the best composite image by using the best representations possible early on.

Therefore, it would have been obvious to combine the medium of Silber (as modified by Parulski et al) with the balancing of Ito et al to obtain the invention as specified in claim 4.

27. Regarding claim 6, the balancing is white balancing (col. 14, lines 36-38) based on the input image, and thus anything in the image including the targets.

28. Claims 26 and 28 are rejected for the same reasons as claims 4 and 6, respectively. Thus, the arguments analogous to that presented above for claims 4 and

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6 are equally applicable to claims 26 and 28. Claims 26 and 28 distinguish from claims 4 and 6 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

29. Claims 10, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Parulski et al and further in view of U.S. Patent No. 5022085 (Cok).

Regarding claim 10, Silber (as modified by Parulski et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Silber (as modified by Parulski et al) does not disclose expressly replacing at least one actual region of occlusion in one image from the set of images with corresponding regions of non-occlusion further comprises at least one of blending, feathering, and pixel averaging, along the edge of the corresponding regions of non-occlusion used to replace any actual regions of occlusion.

Cok discloses blending along the edge of regions that are to be combined (abstract).

Silber (as modified by Parulski et al) and Cok are combinable because they are from the same field of endeavor, i.e. image combining.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to blend the edges.

The suggestion/motivation for doing so would have been to eliminate any overlap-edge artifacts.

Therefore, it would have been obvious to combine the medium of Silber (as modified by Parulski et al) with the blending of Cok to obtain the invention as specified in claim 10.

30. Claim 23 is rejected for the same reasons as claim 10. Thus, the arguments analogous to that presented above for claim 10 are equally applicable to claim 23. Claim 23 distinguishes from claim 10 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

31. Regarding claim 24, Cok discloses feathering pixels along an outer edge of the corresponding areas of non-occlusion with pixels surrounding the areas of actual occlusion being replaced (col. 2, lines 30-35).

32. Claims 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Parulski et al, as applied to claims 12 and 21 above, and further in view of U.S. Patent No 6556243 (Dotsubo et al).

Regarding claim 13, Silber (as modified by Parulski et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Silber (as modified by Parulski et al) does not disclose expressly that the system is embedded in a digital camera.

Dotsubo et al discloses a system that is embedded in a digital camera that includes compositing images (col. 1, lines 32-45).

Silber (as modified by Parulski et al) and Dotsubo et al are combinable because they are from the same field of endeavor, i.e. image processing and compositing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embed the system in a digital camera.

The suggestion/motivation for doing so would have been to provide a user-friendly system that would allow the system to be portable.

Therefore, it would have been obvious to combine the system of Silber (as modified by Parulski et al) with the digital camera of Dotsubo to obtain the invention as specified in claim 13.

33. Regarding claim 22, Dotsubo et al discloses that the computer is integral to a digital camera since it is embedded in the camera, and wherein the composite image is formed automatically from images of a scene captured using the digital camera (col. 1, lines 32-45).

34. Claim 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Ito et al. Claim 16 is rejected for the same reasons as claims 4 and 6. Thus, the arguments analogous to that presented above for claims 4 and 6 are equally applicable to claim 16. Claim 16 distinguishes from claims 4 and 6 only in that it is a broader version of claims 4 and 6 in that the balancing could also be histogram averaging, and that they have different dependencies, both of which have been previously rejected by the same prior art, claim 16 omitting one of the references of claims 4 and 6. Since the dependencies share the same prior art for the elements of the purpose of this rejection, prior art applies.

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35. Claim 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Cok. Claim 20 is rejected for the same reasons as claim 10. Thus, the arguments analogous to that presented above for claim 10 are equally applicable to claim 20. Claim 20 distinguishes from claim 10 only in they have different dependencies, which have been previously rejected by the same prior art, claim 20 omitting one of the references of claim 10. Since the dependencies share the same prior art for the elements of the purpose of this rejection, prior art applies.

36. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Silber in view of Parulski et al and Cok, as applied to claim 23 above and further in view of U.S. Patent Application Publication No. 20030138137 (Bojer et al).

Silber (as modified by Parulski et al and Cok) discloses all of the claimed elements as set forth above and incorporated herein by reference. Cok further discloses replacing areas of actual occlusion in one of the images with corresponding areas of non-occlusion from one of the other images further comprises, as disclosed above.

Silber (as modified by Parulski et al) does not disclose expressly that blending is averaging pixels along an outer edge of the corresponding areas of non-occlusion with pixels surrounding the areas of actual occlusion being replaced.

Bojer et al discloses blending two parts by taking the average of pixels of each part (pg. 1, pp. 0004).

Silber (as modified by Parulski et al) and Bojer et al are combinable because they are from the same filed of endeavor, i.e. composite imaging.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to blend the images by averaging the pixels.

The suggestion/motivation for doing so would have been to provide a more natural composite image by using values that are already in the image.

Therefore, it would have been obvious to combine the process of Silber (as modified by Parulski et al) with the averaging of Bojer et al to obtain the invention as specified in claim 25.

Conclusion

37. It may be noted that the claims currently can read on many different areas of image processing (3D imaging, putting images together in a 2D scene, and de-noising, as the applicant intends). It may help to include the area in the claim in order to narrow the range of search to what the applicant regards as their invention, thus expediting allowability of the application.

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen S. Yuan whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KY

12/7/2006



JOSEPH MANCUSO
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